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STATUS OF MOUNTAIN PINE BEETLE INFESTATIONS ON THE SUPERIOR RANGER DISTRICT, LOLO NATIONAL FOREST ST. REGIS, MONTANA

by

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ABSTRACT

A mountain pine beetle infestation has been active in the St. Regis area since 1964. Heaviest tree mortality occurred during the period 1969-70. The infestation has continued to decline since 1970. Over 2 million board feet of lodgepole and ponderosa pine were killed during the outbreak. Overstocking resulted in slow growth which probably promoted a general weakening of the stand, making some trees more susceptible to attack by mountain pine beetle. Two factors that might be contributing to the decline of the outbreak are:

1. The influence of *Ips* spp. drying out the cambial area in infested trees.

2. The average size of trees being attacked is less than 10 inches d.b.h., resulting in fewer beetles emerging from infested trees than parent adults that attacked.

INTRODUCTION

An outbreak of mountain pine beetle, *Dendroctonus ponderosae* Hopk., started in the Four Mile Flats area, just east of St. Regis, Montana, in 1964. Infestation occurred in a mixed lodgepole-ponderosa pine stand on about 600 acres. The outbreak remained static within the

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600 acres until about 1968. The drought in 1967 may have weakened trees in the overstocked stand to the point that they became more susceptible to bark beetle attack. In 1969, the infestation increased in size to 1,000 acres, and by 1970, approximately 12,000 acres of State, private, and National Forest land were infested. In 1969, efforts to suppress the infestation by salvage logging and felling and burning infested trees did not curtail the outbreak. There were approximately 11.3 infested trees per acre in the Four Mile Flats area in 1970 (Ciesla and McGregor, 1970). The number of infested trees per acre was considerably less in adjacent infested stands in Mayo Gulch and Mill Creek. A survey in 1970 estimated that the total volume loss was 815,388 board feet of ponderosa pine and 892,619 board feet of lodgepole pine during 1969-70. The percent of host volume killed ranged from 0.4 percent in Mayo Gulch to 8.3 percent in Four Mile Flats. Many trees examined were heavily infested with *Ips* spp.

In 1971, the infestation appeared to be decreasing, particularly in older infested areas on National Forest lands. Several hundred new attacks did occur on adjoining State of Montana lands at Four Mile Flats.

During early spring 1972, the Superior Ranger District initiated a survey (Fig. 1) to determine the number of trees killed, volume loss, and acreage infested. The District indicated there was a good possibility to salvage log infested trees and that the survey would establish the basis for salvage sales.

METHODS

A variable plot cruise (BA = 10) was conducted in seven areas. Plots were located at 5-chain intervals on cruise lines 5 chains apart. A Spiegal Relaskop was used to tally in and out trees. Each tree 5 inches d.b.h. and larger occurring in variable plots was recorded by species, measured for diameter at breast height and total height for volume estimates. Trees were then classified into one of the following five classes:

0 - green, uninfested

1 - 1972 attack; green foliage, brood in cambium, blue stain

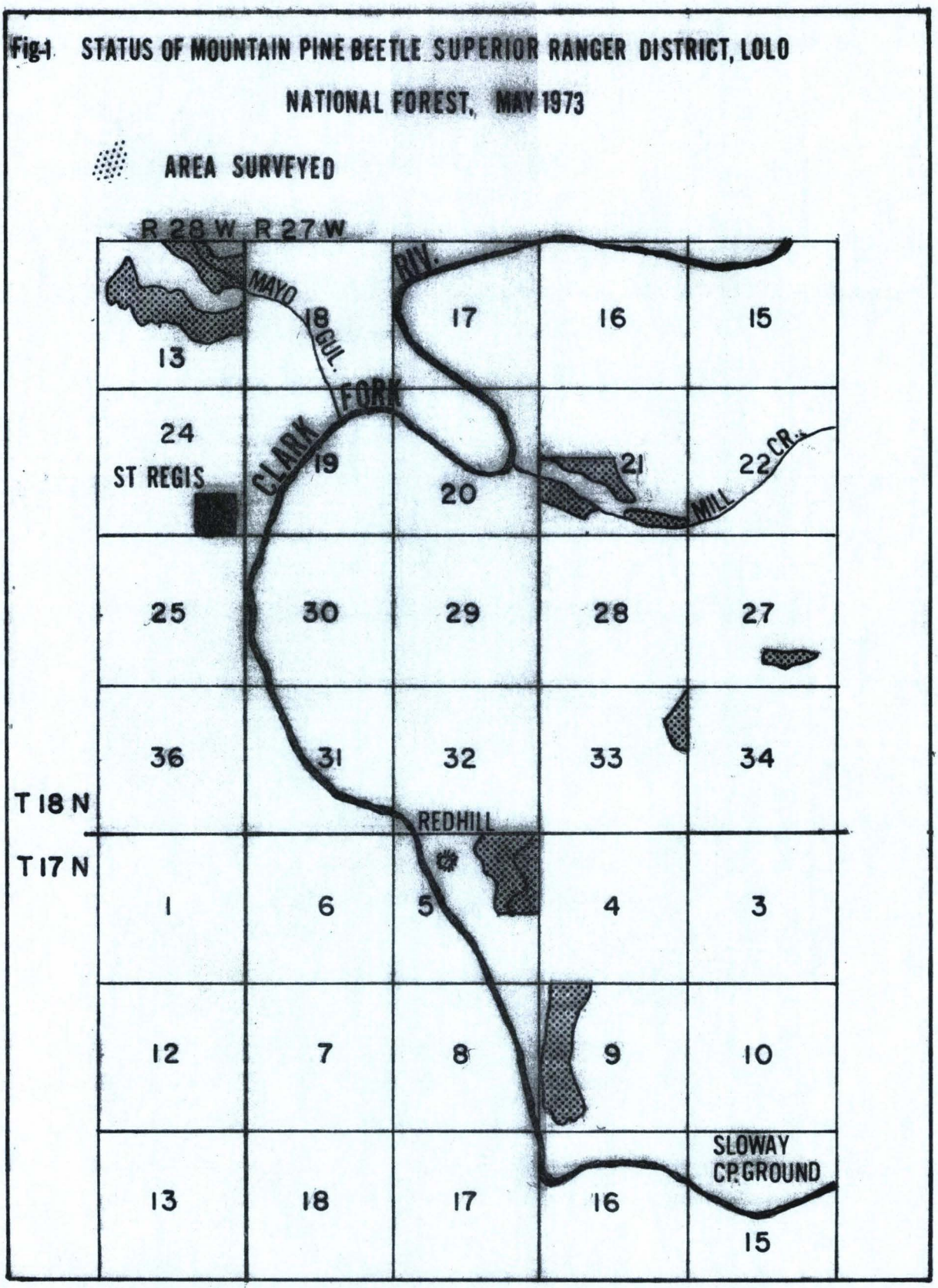
2 - 1971 attack; red foliage, brood emerged

3 - 1970 or prior attack; majority of needles dropped

4 - pitchout; green foliage, pitchtubes, no brood or blue stain

A total of 690 acres was surveyed. Data were analyzed by a modified timber sale cruise program.

Fig-1 STATUS OF MOUNTAIN PINE BEETLE SUPERIOR RANGER DISTRICT, LOLO NATIONAL FOREST, MAY 1973



RESULTS

The mountain pine beetle infestation at St. Regis has decreased considerably since 1970. Areas of heavy infestation in 1970 showed a decrease in many areas in 1971, and no newly attacked trees in 1972. Tree mortality and volume loss data are shown in tables 1 and 2.

The estimated number of trees killed from 1970-72 was 6,798, of which 473 were ponderosa pine. Estimated volume loss for all species was 328,262 board feet. Only two of the seven areas surveyed contained trees killed in 1972. Average d.b.h. of infested trees was 9.0 in 1970, 9.0 in 1971, and 10.0 in 1972. The residual green lodgepole pine stand averaged 9.0 inches d.b.h. The level of infested trees/acre near Red Hill in section 5 was 14.8 in 1970, 8.7 in 1971, and 4.2 in 1972. In section 9, the number of infested trees/acre was 22.8 in 1970, decreasing to 1.0 in 1971, and 1.3 in 1972. It was estimated that 8.4 percent of the stand was killed in 1970, 1.8 in 1971, and 0.7 in 1972. Of the host trees killed, 14.6 percent of the mortality occurred in 1970, 3.2 in 1971, and 1.2 in 1972. No ponderosa pine killed by mountain pine beetle was tallied on cruise lines in 1972. No 1972 attacked trees were recorded on cruise lines in the other areas surveyed.

Table 1.--Estimated lodgepole pine volume loss due to mountain pine beetle, Superior Ranger District, Lolo National Forest, 1970-72

Unit surveyed	Acres infested	Volume loss/acre (board feet)			Total volume loss (board feet)		
		1970	1971	1972	1970	1971	1972
Type 1, sec. 21	200	129	102	0	25,827	20,390	0
Type 2, sec. 13	150	34	0	0	5,147	0	0
Type 3, sec. 13	60	0	0	0	0	0	0
Type 4, sec. 5	60	709	397	284	42,568	23,811	17,043
Type 5, sec. 33	40	701	0	0	28,040	0	0
Type 6, sec. 27	20	0	0	0	0	0	0
Type 7, sec. 9	160	872	73	89	139,593	11,645	14,197
Total	690	2,445	554	373	241,175	55,846	31,240

Table 2.--Estimated tree mortality, Superior Ranger District
Lolo National Forest, 1970-72

Unit surveyed	Acres infested	Infested trees/acre						Number lodgepole and ponderosa pines killed			
		1970	Ave. d.b.h.	1971	Ave. d.b.h.	1972	Ave. d.b.h.	1970	1971	1972	Total
Type 1, sec. 21	200	1.8	11	2.3	8	-	-	361	461	-	822
Type 2, sec. 13	150	.9	8	-	-	-	-	134	-	-	134
Type 3, sec. 13	60	-	-	-	-	-	-	-	-	-	-
Type 4, sec. 5	60	14.8	9	8.7	10	4.2	10	709	524	252	1,485
Type 5, sec. 33	40	4.1	15	-	-	-	-	165	-	-	165
Type 6, sec. 27	20	-	-	-	-	-	-	-	-	-	-
Type 7, sec. 9	160	22.8	9	1.0	11	1.3	10	3,648	166	202	4,016

DISCUSSION

Lodgepole pine comprises 44.6 percent of the coniferous stand in areas surveyed; 30.3 percent is Douglas-fir, 13.0 percent is ponderosa pine, and 11.9 percent is western larch.

Elevation within the infested area ranged from 2,800 to 3,000 feet. Habitat type in areas surveyed is *Pseudotsugae menziesii-Linnaea borealis*.

The number of trees killed by mountain pine beetle increased slowly from 1964 to 1968, then increased sharply in 1969. A steady decrease in the infestation has occurred since 1970, the peak year. Infestation has also decreased on adjoining State and private ownership.

Evaluations during the fall of 1970 showed infested trees contained a mixture of mountain pine beetle and numerous *Ips* spp. (McGregor and Bousfield, 1970). Of the *Ips* spp. identified that emerged into square foot plastic screen cages attached on lodgepole pine at Four Mile Flats, 56.0 percent were *Ips latidens* Lec., 27 percent *Ips pini* Say., 16 percent *Ips emarginatus* (Lec.), 1.8 percent *Ips mexicanus* (Hopk.), and 1.8 percent *Ips plastographus* (Lec.). Emergence data for 2 years showed *Ips* spp. outnumbered mountain pine beetle 3 to 1. However, the relationship between *Ips* spp. and mountain pine beetle populations was not investigated during this infestation. The influence of *Ips* spp. populations probably had some effect in reducing mountain pine beetle populations because the cambial layer of trees attacked by *Ips* dried out much faster than those trees infested only by mountain pine beetle. This drier condition was favorable for *Ips* broods to develop, but appeared unfavorable for mountain pine beetle brood development. The higher ratio of *Ips* to mountain pine beetle probably accounts for this.

Another factor that may account for the population decline is the smaller diameter trees that were attacked in 1971-72, compared to larger diameter trees attacked prior to that time. Trees smaller than 12 inches d.b.h. produce fewer beetles than the number of adult beetles which attacked the trees (Cole and Amman, 1969). When this occurs, the beetle population either remains static or declines.

The Superior Ranger District is actively engaged in a salvage logging effort to remove dead, as well as currently, infested trees. Sale of small diameter trees in the past 4 years has hampered salvage logging in the area. Commercial thinning to remove infested trees and convert the stand to a faster growing stand may have shortened the duration of the outbreak.

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